

On the seventh day, as the flap showed no promise of retracting, I reopened the post-aural wound, and found that from here all along the posterior meatal wall bone and skin were separated by a clot. In amount this clot was sufficient to fill a dessert-spoon, and more than the space would be expected to hold; much of it lay in the deepest part of the meatus, levering the cut skin-edge forwards, so that it lay directly over and parallel to the drum. After the removal of the clot and the passage of a tube as before, healing, with a good lumen and cure of all symptoms, was uneventful.

This case shows that, apart from any of its general physiological disadvantages, adrenalin may cause mechanical trouble by reason of the vasomotor paresis which follows the phase of vaso-constriction.

## THE BREAKING OF THE VICIOUS CIRCLE.

BY

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DISEASE, when complicated by the presence of a vicious circle, presents problems for solution peculiar to itself. The physician is no longer confronted with a morbid process which Nature is doing her best to rectify, and where treatment mainly consists in furthering and regulating her efforts. When a circle is present Nature is aggravating the disorder. The *vis medicatrix* has become the *vis devastatrix*, and what looms before the sufferer is at best a prolonged disorder, at worst a *descensus Averni*.

Vicious circles are widespread in their distribution, and play a great part in clinical medicine. Their study promotes a visualization of those pathological sequences that are ever acting reciprocally on each other, and greatly assists the accurate adaptation of remedies to the complex conditions of disease.

Although a large part of the *ars medendi* consists in "breaking the circle," this aspect of therapeutics has, strange to say, almost wholly escaped attention. True, many years ago a great teacher wrote: "Let it be a cardinal principle of treatment to make an effort to interrupt vicious circles."<sup>1</sup> But even to-day our textbooks give but little assistance in the solution of problems presented by reciprocally acting consequences. It may be useful to indicate the principles on which treatment under such circumstances must be based, and to illustrate those principles by a few examples.

### LOCUS MINORIS RESISTENTIAE.

One signal advantage presented by the circle is that there are at least two points at which its evil round may be interrupted. In the words of Lauder Brunton, "We must see where the circle can best be broken," since, "if we can break the circle at one point, we allow recovery to commence."<sup>2</sup> Our first step then is to seek the *locum minoris resistentiae*. The discovery may not be easy, inasmuch as it presupposes an accurate diagnosis of the various factors that constitute the circle, and this may involve a painstaking investigation, as emphasized by Clifford Allbutt:

First of all we shall begin by a close searching for any vicious circle of function, and, if found, of cutting any link of it, whatsoever or wheresoever. . . . A floating kidney, a disorder of the uterus, a faulty eye, a "tea" or "tobacco" heart, or other local irregularity, trivial enough perhaps in itself, may close and perpetuate the vicious orbit of function.<sup>3</sup>

When the factors constituting the circle have been elucidated, our duty is to break it through at the weakest point. If the gyration can be stopped the whirling currents will be restored to their normal direction. "The hound which had turned to hunting its own tail may be put again on the track."

The *modus operandi* will vary with the special circumstances of each case. But some illustrations may be grouped under the following heads:

- I. The breaking of the circle by hygienic measures.
- II. The breaking of the circle by surgical appliances.
- III. The breaking of the circle by drugs.
- IV. The breaking of the circle by operation.

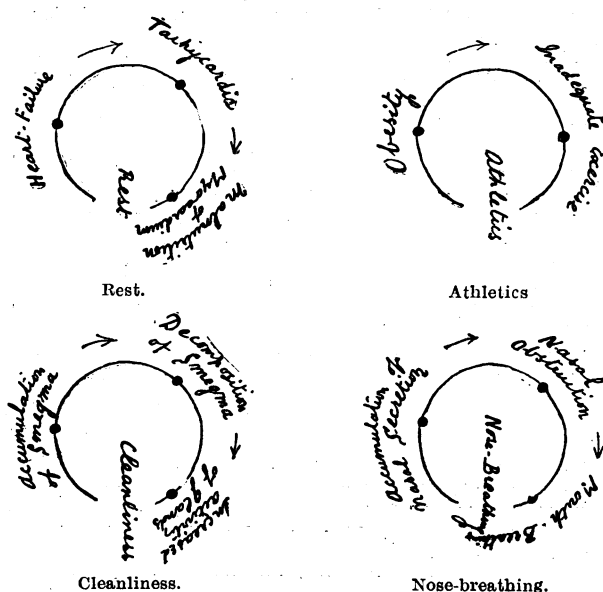
### I. The Breaking of the Circle by Hygienic Measures.

**Rest.**—Physical rest is a powerful means of breaking some circles. An illustration is presented by many cases of cardiac failure, where a dilated and overburdened myocardium is associated with visceral disorder, the two conditions acting and reacting on each other.

Gibson thus describes the circle:

Sooner or later, according to its form and severity, chronic valvular disease, with compensation, itself disposes to failure by establishing a vicious circle of slow, progressive impairment of the viscera and their great vital functions—the lungs, liver, stomach, bowels, kidneys, indeed the myocardium itself.<sup>4</sup>

In many such cases, if the patient is kept so quiet as "not to take one beat out of the heart more than can possibly be avoided," immense relief is given to the failing myocardium. More blood is sent to the lungs and viscera, and returns as a more nutrient and aerated supply. The cardiac action is strengthened, its tonicity is raised, so that the heart can pump out the stagnating blood and lower the venous pressure. Even moribund persons



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recover, and continue practically well for years. Lauder Brunton describes the value of such absolute rest:

As in many other things the conditions in cardiac disease form a vicious circle. The disordered circulation disturbs the function of other organs, and these in turn make the circulation worse. . . . In such cases it is evident that the patient is bound to die, and to die a somewhat painful death, unless medical art can afford him some assistance. It is very fortunate, however, that in such cases medical art can do so much. . . . If we break the vicious circle at one point, we allow recovery to commence; and one of the most important agents—I think I ought to say the most important agent—in the physician's power is absolute rest.<sup>5</sup>

**Exercise.**—Under other circumstances the opposite measures, namely, increased exercise, is called for, as in the circle of obesity, which Krehl describes:

As soon as the accumulation of fat begins to deter the patient from taking active exercise a vicious circle is established, and he tends to increase in weight more and more.<sup>6</sup>

If the physician insists on some athletic sport, or at any rate on a more active mode of life, the morbid correlations may be interrupted and health restored.

**Cleanliness.**—Want of cleanliness may give rise to various circles, as, for example, to seborrhoea genitalium, where retained and putrefying secretions irritate the prepuce and glans, and thus provoke further secretion and putrefaction. In Corner's words:

The greater the irritation of the glands by decomposing secretion the greater the amount of secretion they produce. In this way a vicious circle is established.<sup>7</sup>

The regular removal of these secretions will rapidly diminish the excessive glandular activity, and thus check the morbid reactions.

**Prevention of Infection.**—This may be illustrated by the success of preventive measures where thread-worms are present. When a case is left to Nature, the irritation at the anus secures by auto-infection the continuance of the race of parasites producing it, and patients thus keep up their stock of parasites for many years. If, however, precautions are taken so as to prevent reinfection from without as well as auto-inoculation, the worms disappear rapidly and a radical cure may be looked for in four to six weeks, that being the period by which all the ova swallowed on a particular date will have developed into worms and been evacuated in the faeces.<sup>8</sup>

**Nose-breathing.**—A fifth illustration may be found in restoration of nasal respiration, where mouth-breathing has established a circle. In weakly children nasal secretions are sometimes allowed to accumulate and block the nostrils until the child resorts to mouth-breathing. This in its turn favours the retention of nasal secretions and consequent nasal obstruction. As Ashhurst says:

Obstruction, by preventing or interfering with the expulsive force of the expiratory current, prevents the removal of the usually abnormal amount of secretion, either by blowing the nose or otherwise; its accumulation is in its turn an efficient factor in producing obstruction, and a vicious circle . . . is thus established.<sup>9</sup>

By efficient use of the pocket-handkerchief the nasal passages can be cleared and the circle broken.

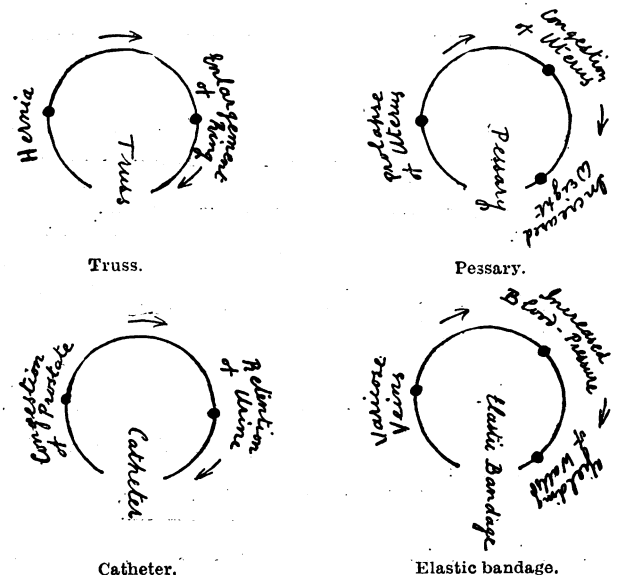
## II. The Breaking of the Circle by Surgical Appliances.

**Elastic Bandage.**—Varicose veins are frequently complicated by a circle, since the dilatation leads to increased tension on the vein-walls, and the increased tension aggravates the dilatation. As Romberg writes:

It is often impossible to say how the disorder originates, for the venous dilatation (due to some mechanical obstruction) and the anatomical changes in the vein-walls act reciprocally on one another. Thus a vicious circle, whose pathogenesis is obscure, controls the course of events.<sup>10</sup>

The use of an elastic bandage supports the weakened walls of the veins, prevents their further dilatation and breaks the circle.

**Catheter.**—Prostatic retention of urine is often due to reciprocal correlations. For the enlarged venous plexuses



THE BREAKING OF THE CIRCLE BY A SURGICAL APPLIANCE.

surrounding the prostate in elderly men readily become congested, causing obstruction to the urine which accumulates in the bladder. The pressure of the urine in its turn aggravates the venous engorgement, and so the process is perpetuated. Catheterization by evacuating the bladder relieves the pressure on the venous plexuses and cures the retention.

**Pessary.**—Uterine congestion and prolapse are other conditions which aid and abet one another, and so give rise to a circle. A well-adjusted pessary prevents the prolapse and thus relieves the congestion, and breaks the circle.

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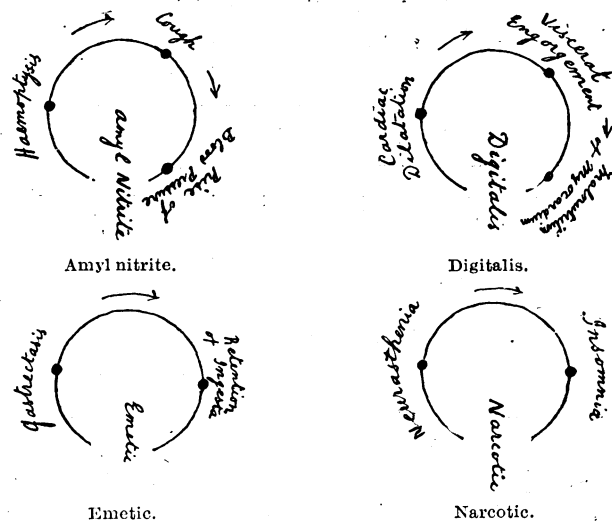
**Concave Lens.**—A fourth illustration is presented by progressive myopia in which the myopia and the elongation of the eyeball react on one another. As Sattler writes:

If the elongation of the eyeball has once begun, myopia has a tendency to react upon itself by a kind of vicious circle as long as the noxious conditions which caused it are still in action. The posterior wall of the sclerotic, now somewhat attenuated, is more liable to give way, and the more egg-shaped the globe becomes the longer is the region of contact of the muscles with the surface of the eye.<sup>11</sup>

The prescription of concave lenses removes the near point, relieves the undue pressure on the globe, and checks the progress of the myopia.

## III. The Breaking of the Circle by Drugs.

**Amyl Nitrite.**—Haemoptysis may be complicated by what Hare calls "one of the most highly vicious circles in pathology," the haemorrhage, the cough, mental per-



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turbation and rise of blood pressure being factors that act and react on one another. One practitioner considers that he can best break the circle by using amyl nitrite<sup>12</sup> to lower the blood pressure. A second prefers to lull the cough by means of morphine. A third pins his faith to the styptic action of ergot. In each case what appeared the *locus minoris resistentiae* is attacked.

**Digitalis.**—Many cases of failing heart are complicated by tachycardia. The enfeebled myocardium beats so rapidly that the ventricles can neither fill nor empty themselves as they should. The result is progressive weakening of the myocardium, and a dangerous circle is present, which may be broken by digitalis, as Pavlov describes:

An uncompensated heart beats rapidly, and thereby only aggravates its condition. Its time of rest—that is of recovery—of restitution of the organ is shortened. A vicious cycle is set up. The weak action of the heart lowers blood pressure, the lowering of this leads (from known physiological causes) to an increase in the number of beats, the quickening leads to weakening of the organ. Without doubt the digitalis aids by breaking through this vicious cycle in that it greatly slows the pulse, and thereby gives new power to the heart.<sup>13</sup>

**Sedatives.**—Conditions of exaggerated reflex excitability are often met with in which prolonged irritation and weakness have led to a state of unrest which perpetuates and intensifies the weakness. Thus the respiratory centre may be exhausted by constant irritation of the air passages giving rise to incessant coughing. Or the gastric centre, taxed by severe stimulation from stomach, kidney or uterus, lapses into a similar condition of irritable weakness. Although useless, the vomiting continues incessantly and may prove fatal.

Rest is urgently indicated for all cases of this kind, and has to be secured in many instances by means of morphine, which breaks the vicious circle of unrest and irritability; and a beginning once made, rest begets rest.<sup>14</sup>

Other circles are closely associated with the presence of pain or insomnia. The reciprocal correlations can here be

attacked by a suitable sedative, which by the removal of pain will break the circle; as Herman has well described:

The great causes of neurasthenia are conditions which (a) cause continuous pain, and (b) prevent sleep. The two things often form a vicious circle. A small local cause disturbs sleep, and want of sleep makes the nervous system over-sensitive. In proportion as the neurasthenic symptoms have coincided in time with the development of local pain, so surely may we conclude that the removal of the local pain and the procuring of sound sleep will cure the neurasthenia.<sup>15</sup>

**Emetic.**—A troublesome circle may be due to dilatation of the stomach associated with prolonged retention of food. The dilatation increases the stasis, and the stasis the dilatation.

Dilatation may be the cause, accompaniment, or sequel of chronic gastritis; subacidity with fermentation and stagnation forms a vicious circle constituting Cohnheim's so-called vinegar and gas factory, and may likewise be regarded as an important etiological factor.<sup>16</sup>

The timely use of an emetic may rapidly and completely relieve the condition. Even a greatly dilated and overloaded stomach may be braced up. The unburdening is followed by contraction and renewed functional activity.

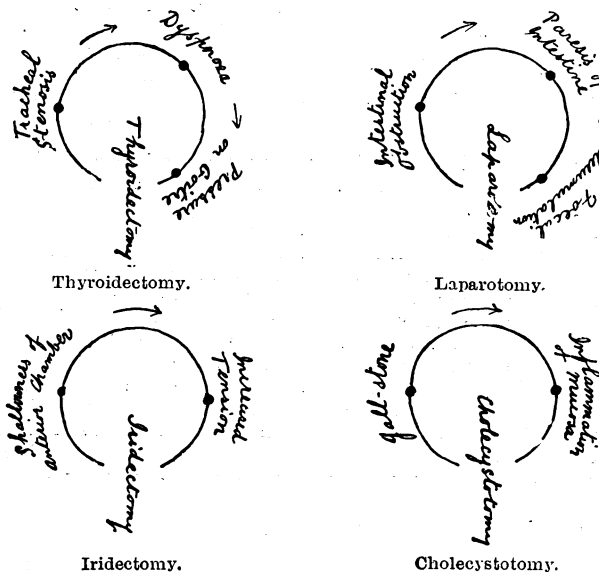
#### IV. The Breaking of the Circle by Operation.

Surgery achieves some of her greatest triumphs by attacking the *locum minoris resistentiae*, and so breaking the circle.

**Cholecystotomy.**—Biliary, renal, vesical, and other calculi are all associated with reciprocal correlations established between the mucosa and the irritating calculus. Rolleston thus describes the circle associated with gall stones:

Although gall stones are due to inflammation, of a comparatively mild character, of the gall bladder, their presence predisposes to fresh infection of the gall bladder, and thus to cholecystitis and to a vicious circle.<sup>17</sup>

Here the surgeon can remove the calculus that is perpetuating the morbid condition. The pathological sequences



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are interrupted, and the mucosa returns to a more or less quiescent condition.

**Thyroidectomy.**—Another circle frequently broken by operation is associated with tracheal stenosis due to goitre. When an enlarged thyroid compresses the trachea so as to greatly reduce the lumen, any unusual effort may interfere with the adequate supply of oxygen. Nature, in response, calls the supplementary respiratory muscles into action. But unluckily the contraction of these muscles, so beneficent in some respects, presses the hypertrophied thyroid further against the trachea so as to narrow the lumen even more than before. They thus increase instead of relieving the dyspnoea, which often ends in self-strangulation. In Fraenkel's words:

The sufferer gets into the clutches of a vicious circle. The greater the want of oxygen, the more vigorous and prolonged the muscular contractions; the more vigorous the latter, the greater the compression of the trachea and the less room for the admission of air.<sup>18</sup>

Here prompt relief can be given by thyroidectomy, which relieves the stenosis and arrests the dyspnoea.

**Iridectomy.**—Glaucoma is another grave disorder, which, in the words of Priestley Smith, "perpetuates and intensifies itself in a vicious circle." The correlations are thus described by Lawson:

The sudden raising of the intra-ocular pressure increases the congestion, to be followed in its turn by a serous exudation from the venous channels, with a consequent further increase of pressure, and thus a vicious circle is quickly established, with symptoms of ever-increasing violence.<sup>19</sup>

The iridectomy lowers the intra-ocular pressure, which would otherwise end in blindness.

**Laparotomy.**—Intestinal obstruction may be complicated by various circles, which the surgeon breaks by laparotomy. One of them is thus described by Nothnagel:

Paresis and paralysis of the bowel may appear very early in the course of peritonitis, especially in perforative peritonitis, where it is most probably due to reflex inhibition of intestinal peristalsis. Paresis gives rise to meteorism, since gas continues to collect and accumulate in the bowel, as it is not driven onward. . . . As soon, however, as a considerable quantity of gas accumulates in the intestine, the vicious circle is completed, for gaseous distension of the intestine leads to further impairment of its muscular powers and eventually to over-distension and paresis or to definite paralysis.<sup>20</sup>

These few examples illustrate the principle of breaking the circle by attacking the *locum minoris resistentiae*.

#### TREATMENT OF SEVERAL FACTORS.

At other times it may be impossible to ascertain the weakest link in the chain. The wisest course is then to attack each of the factors concerned, at any rate in such complex conditions of disease as Amand Routh describes:

We have frequently to deal with a vicious circle, with local and constitutional states so interacting that no real improvement is possible until both the general and local states receive their due share of attention.<sup>21</sup>

Striking examples of this are met with where digestive disorders are associated with disease of other organs, whether as cause or consequence of the visceral condition. Thus Mitchell Bruce writes:

The pathological relations of the gastric disorder or catarrh and the diseases of the other organs are usually complex, a vicious circle being set up between them; and the stomach therefore calls for direct treatment as well as attention to the cause.<sup>22</sup>

If the practitioner cultivates the habit of thinking of disease as operating in circles, he will continually meet with illustrations of that interdependence of organs and of the importance of attacking each factor in the morbid process. His study of the art of breaking the circle will render his treatment more philosophical and more successful.

#### THE IMPORTANCE OF EARLY TREATMENT.

Lastly, since the circle is a self-aggravating process, it should be broken at the earliest moment. As Clifford Allbutt graphically says:

In vicious circles every gyration deepens the groove, an abnormal habit is formed so that arrest of such a local waste of energy and such a distress becomes more and more difficult. . . . The longer the "habit"—the fixtures of organic memory—the harder the impulse needed to "break the circle," for the habit has become independent of the original cause, which, indeed, had often vanished.<sup>23</sup>

Worthy to be kept in everlasting remembrance are the words of Ovid:

Principiis obsta; sero medicina paratur,  
Cum mala per longas convaluerint moras.

#### REFERENCES.

- <sup>1</sup> M. Bruce, *Principles of Treatment*, p. 265.
- <sup>2</sup> *Therapeutics of the Circulation*, p. 129; *BRITISH MEDICAL JOURNAL*, 1910, vol. ii, p. 1392.
- <sup>3</sup> Allbutt and Rolleston, *System of Medicine*, vol. viii, p. 777; *BRITISH MEDICAL JOURNAL*, 1910, vol. i, p. 413.
- <sup>4</sup> *Textbook of Medicine*, vol. ii, p. 127.
- <sup>5</sup> *Therapeutics of the Circulation*, p. 129.
- <sup>6</sup> *Clinical Pathology*, tr. by Hewlett, pp. 342, 344.
- <sup>7</sup> *Male Diseases in General Practice*, p. 398.
- <sup>8</sup> Allbutt and Rolleston, *System of Medicine*, vol. ii (ii), pp. 892-3.
- <sup>9</sup> Ashhurst, *Cyclopaedia of Surgery*, vol. v, p. 404.
- <sup>10</sup> *Krankheiten des Herzens und der Blutgefäße*, p. 496.
- <sup>11</sup> *Transactions of the Ophthalmological Society of the U.K.*, 1907, vol. xxvii, p. 12.
- <sup>12</sup> Hare records some remarkable cases in which the circle that complicates haemoptysis was instantaneously broken by amyl nitrite, *Food Factor in Disease*, vol. ii, p. 97.
- <sup>13</sup> *The Work of the Digestive Glands*, tr. by Thomson, 1910, p. 233.
- <sup>14</sup> M. Bruce, *Principles of Treatment*, p. 231.
- <sup>15</sup> *BRITISH MEDICAL JOURNAL*, 1910, vol. i, p. 183.
- <sup>16</sup> Osler and Macrae, *System of Medicine*, vol. v, p. 285; Cohnheim, *Lectures on General Pathology* (N.S.S.), pp. 859, 862.
- <sup>17</sup> *Diseases of the Liver*, 1905, p. 746.
- <sup>18</sup> *Lungenkrankheiten*, p. 8.
- <sup>19</sup> *Diseases and Injuries of the Eye*, p. 236.
- <sup>20</sup> *Diseases of the Intestines and Peritoneum*, p. 773.
- <sup>21</sup> Allbutt, Playfair, and Eden, *Gynaecology*, p. 737.
- <sup>22</sup> *Principles of Treatment*, p. 459.
- <sup>23</sup> *Nature*, 1911, vol. i, p. 374.